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ANNUAL REPORT
to the
MASSACHUSETTS WATER RESOURCES COMMISSION
by the
Director and Chief Engineer
Division of Water Resources
for the
Fiscal Year Ending - June 30, 1978

PUBLICATION #10852-100-21-9-78-CR
APPROVED by Alfred C. Holland, State Purchasing Agent

INTRODUCTION

Chapter 21, Section 8 of the General Laws of the Commonwealth, enacted in 1956, established the existence, the duties and the jurisdiction of a Water Resources Commission under whose supervision and control would be the Division of Water Resources. Subsequently, in 1966, Chapter 685 established a Division of Water Pollution Control as the second operating agency of the Commission. The current make-up of the Commission was instituted pursuant to Chapter 706, of the Acts of 1975, which extensively amended Chapter 21.

The mandates were clear. The Commission was charged with the responsibility for the study of the needs, supplies and resources of the Commonwealth with respect to private and public use of water, water conservation and flood damage prevention.

This report intends to summarize the progress by the Division of Water Resources during Fiscal Year 1978, in response to those mandates.

Supervisory responsibility for the Division is incorporated in the following individuals who constitute the Water Resources Commission as of June 30, 1978.

Co-Chairman - Richard E. Kendall, Commissioner
Department of Environmental Management

Co-Chairman - David Standley, Commissioner
Department of Environmental Quality Engineering

Department of Food & Agriculture Representative -
Frederick Winthrop, Jr., Commissioner

Designee: John Barrus, Assistant Commissioner
Department of Food & Agriculture

Department of Commerce & Development Representative
John Crosier, Commissioner

Designee: Warren Dillon
Department of Commerce & Development

Department of Fisheries, Wildlife & Recreation Vehicles Representative
Bruce Gullion, Commissioner

Designee: Paul S. Mugford
Division of Fisheries & Wildlife

Department of Metropolitan District Commission Representative
John Snedeker, Commissioner

Designee: Julia O'Brien
Metropolitan District Commission

Public Members - Peter C. Karalekas
322 Prospect Street
East Longmeadow, Ma 01028
Appointment expires - 11/29/77

Alan S. Murphy, Jr.
85 Kingswood Dr.
Westwood, Ma 02090
Appointment expires - 12/15/78

Richard Noss
106 Centre Street
Milton, Ma 02186
Appointment expires - 11/29/79

Rita Barron
76 Walden Street
Newtonville, Ma 02160
Appointment expires - 11/29/78

5th Public Member - Vacant

PERSONNEL OF THE DIVISION (as of June 30, 1978)

Kennedy, Charles F.	Director & Chief Engineer
Pyle, O. Fletcher	Associate Civil Engineer
Doucette, Thomas F.	Associate Civil Engineer
Chandler, Emerson H.	Chief Planner
Beshara, Michael L.	Principal Civil Engineer
Shapiro, Sheldon	Principal Civil Engineer
Maguire, Kevin B.	Senior Civil Engineer
Rawls, Margaret	Resources Planner
Bones, William F.	Resources Planner
Connor, Joseph M.	Assistant Planner
Hardin, Meriel	Associate Planner
Kalishes, Vincent	Principal Planner
Kilner, Suzanne	Principal Planner
Hazel, William I.	Assistant Civil Engineer
Beal, Larry	Land Use Administrator
Grice, David	Resources Planner
Levine, Nathan R.	Senior Civil Engineering Draftsman
Krol, William A.	Senior Civil Engineer
Hayward, David F.	Principal Right-of-Way Agent
Struzziero, Ernest J.	Assistant Civil Engineer
Preston, Katherine	Land Use Administrator
Tanzer, Philip	Senior Statistical Clerk
Dicesare, Richard	Senior Bookkeeper
Brosnahan, Helen R.	Principal Clerk
Kirshen, Cynthia	Junior Clerk Typist
O'Keefe, Karen	Junior Clerk Typist

ADMINISTRATIVE APPROPRIATIONS

<u>Fiscal Year</u>	<u>Appropriation</u>
1959	\$ 70,800
1960	75,915
1961	79,475
1962	88,920
1963	117,402
1964	129,649
1965	139,181
1966	140,573
1967	127,946
1968	153,411
1969	190,412
1970	174,705
1971	202,740
1972	213,808
1973	227,300
1974	247,899
1975	259,854
1976	262,155
1977	345,000
1978	379,152

In addition, the following sums were appropriated for the operation of Interstate Flood Control Commission:

Connecticut River Valley Flood Control Commission	\$49,500
Merrimack River Valley Flood Control Commission	

These funds were used for the payment of the Commonwealth's share of operating the respective Flood Control Commissions and the annual tax and economic losses to the upstream states caused by the construction of flood control reservoirs.

Other Major Appropriations:

Water Planning	\$ 51,917.00
Flood Control	198,472.00
P.L. 566 Maintenance	47,300.00
Federal Cooperative Studies	137,000.00
New England River Basins Commission	44,483.00
Ipswich River Watershed District	1,000.00

TOTAL BUDGET APPROPRIATION

<u>Fiscal Year</u>	<u>Appropriation</u>
1978	\$ 908,824

REGIONAL INTERSTATE COMPREHENSIVE WATER AND RELATED LAND
RESOURCES PLANNING

Planning Activity took place in four interstate river basins during 1978. A Level B study, headed by the state of New York, was ongoing in the Hudson River Basin. Since only 2 percent of the basin is within the Commonwealth of Massachusetts this was not a major activity of the Massachusetts Division of Water Resources.

Of more importance to the Commonwealth is the Pawcatuck Narragansett Bay Study, headed by the Corps of Engineers. This study involves Massachusetts and Rhode Island and is focused upon flooding and water supply issues in the Taunton and Blackstone River Basins. A draft report was produced during FY 78 and was reviewed by the Division of Water Resources. The Report of this Level C study is currently undergoing revision as a result of the review process.

An urban study is planned for the Housatonic River in Western Massachusetts and Connecticut. The New England Division of the Corps of Engineers, is developing a Plan of Study in cooperation with the states which should address the problem of PCB-polluted groundwater as a study element.

The remaining interstate studies are those which have evolved from the Connecticut River Level B investigation completed in 1970. These studies are led by the New England River Basin's Commission with participation by the State's and Federal Agencies.

The first of these investigations is the Section 73 study evaluating non-structural approaches to flood damage prevention. The grantee has membership on the coordinating and work groups. During the year, draft land use maps for the Northampton Study area were produced, as was a social, political and environmental analysis. Considerable progress was also made on an evaluation of flood damage modification alternatives.

The second NERBC study is known as the Cumulative Impact Study. Like the previous investigations, it is focused on The Connecticut River Basin, with the intent that it evaluate techniques applicable elsewhere. Grantee participation is similar to that in the Section 73 study. Progress during the fiscal year included the drafting of a Plan of Study and the selection of a consultant. The initial phases completed included the identification of existing and/or potential imbalances and compatibility between functional water uses and the survey of analytical techniques for predicting and assessing the cumulative impacts of water resource developments.

Reports, Publications and Documents FY 1978

Metcalf & Eddy, Inc. in cooperation with the Division of Water Resources and the Ipswich River Watershed District Commission, Ipswich River Basin Water Study Interim Report

U.S. Department of the Interior, Geological Survey in cooperation with the Commonwealth of Massachusetts Water Resources Commission, Hydrologic Data of the Charles River Basin, Massachusetts, 1977, 53 pages

U.S. Department of the Interior, Geological Survey in cooperation with the Commonwealth of Massachusetts Water Resources Commission, Hydrologic Data of the Coastal Drainage Basins of Southeastern Massachusetts, Plymouth to Weweantic River, Wareham, 1977, 31 pages

State Planning and Accomplishments

State water planning activities during Fiscal 1978 can be classified in four general categories: basic data acquisition, regional resources evaluations, Level B and C studies led by the New England River Basins Commission or federal agencies, and overall water plan policy studies led by the Executive Office of Environmental Affairs.

Basic data gathering, including rainfall recording, stream gaging, snow surveys and flood monitoring, continued routinely as required to provide the necessary foundation for detailed water supply and flood control planning. No new stations were acquired during the year but the Commission continues to operate a system of rainfall stations, the total number of rainfall stations remaining at 199 in Massachusetts. The rainfall for calendar year 1977 is shown and compared with the normal rainfall. This service is valuable to engineers, students, architects, and the legal profession.

Regional resource studies may be based primarily on watersheds, groups of watersheds, or in some cases, groups of towns. A listing of such studies or planning activities includes the following:

Ipswich River District Water Supply

The firm of Metcalf and Eddy Inc. has been engaged by the Ipswich River Watershed District Commission in cooperation with the Massachusetts Water Resources Commission to investigate appropriate methods of management of the Ipswich River water supply by regulation and allocation of its groundwater well supplies and surface water flow.

An interim report was released by the consultants in February, 1978. The study has focused on three main areas at present; water needs, water availability and river management. According to the report, if water supplies are to be obtained from the Ipswich River through the year 2000 and if environmental conditions in the river and surrounding areas are to be maintained or improved, a number of measures may be considered.

- a) Water use may be restrained.
- b) Groundwater remote from the river may be developed to utilize available aquifer storage.
- c) Sewage may be treated and returned to the river rather than exported from the basin.
- d) Sufficient storage capacity may be constructed to avoid demands on the river during low flow periods or to augment flow in the river at critical points.

These measures will be considered in greater detail in the final report to be published in early FY 79.

Cape Cod Hydrologic and Other Ground Water Studies

The comprehensive study of ground water resources of Cape Cod, Massachusetts, continued during FY 78. Fieldwork was completed and an atlas report is in progress as is construction and verification of the digital model. The four year, \$700,000 study funded jointly by Barnstable County, the Massachusetts Water Resources Commission, USGS, and the National Park Service is being performed by the USGS. The Massachusetts Water Resources Commission will continue administration of the funding and conduct of the study through close coordination with USGS, Barnstable County Commission and the local Barnstable County Task Force toward the objective of testing alternative methods of developing and managing the ground water of Cape Cod. The study is scheduled to be completed by October of FY 79.

Under the "Atlas Program" funded jointly by the U.S. Geological Survey and the Massachusetts Water Resources Commission, progress was made on several basin studies during FY 78. The review of three atlas reports for Northeast Coastal basins (Mystic, Shawsheen, lower Merrimack) was completed and are awaiting the Director's approval. Fieldwork is continuing on schedule for the Su As Co and Blackstone Basins. The study on Martha's Vineyard is scheduled for completion at the end of FY 78.

Overall Water Plan Studies

Massachusetts Water Supply Policy Statement

The Division, as a member of the study team headed by the Office of Environmental Affairs, was involved in the completion of the Massachusetts Water Supply Policy Statement. The consultant firm of Wallace, Floyd, Ellensweig and Moore, Inc., Architects/Planners, produced a document which examines the need for sound state policies and recommends several policy packages for consideration.

The conclusion developed in the study is that the Commonwealth must adopt a comprehensive water strategy that achieves a reasonable and equitable balance between resource use and its protection and conservation. Water of unlimited quantity and high quality can no longer be taken for granted. If the Commonwealth wishes to assure long range availability of the resource its judicious control, management and allocation is essential. The strategy requires long range policy to guide decisions and courses of actions, programs to implement policy, and short term priority actions to institute programs; thus moving the recommended comprehensive water resource planning and management process into implementation.

There are five basic problems that summarize the water related issues in the Commonwealth today. They are:

- a lack of water consciousness - the public is generally ignorant of the sources of their water, the limitations, and the compromises necessary to assure a continued supply.
- resource/population - intensive urban development in the Commonwealth occurs primarily within those areas of the state that have the least natural water resources.
- competitive uses of water - both our society and our environment place many conflicting demands on water resources.
- uncoordinated resource planning- there is no administrative mechanism or process to assess and resolve issues that arise in the allocation of water resources.
- undefined public role - water resource management has been achieved only through an uncoordinated mixture of public and private interests. The public role has not been clearly defined and is not well understood.

It is the objective of the Commonwealth of Massachusetts to manage its streams, lakes, and groundwater so that all competing demands are harmonized with available supplies, within and among regions, recognizing immediate and continuing priorities for the provision of supply, for assurance of public health, safety and welfare consistent with long range assurance of supply for the conservation and enhancement of environmental quality.

Massachusetts Water Resources Study

The Type IV Massachusetts Water Resources Study, a cooperative effort between the U.S. Department of Agriculture and the Massachusetts Water Resources Commission, is being conducted to provide information and technical data for a comprehensive plan for the development and use of the Commonwealth's water and related land resources. Investigations and analyses cover such items as identification of potential and existing upstream reservoir sites, determination of present land use with projections for future land use, identification of selected flood-prone areas, with alternatives for providing flood protection, identifications of existing wetlands in selected areas based on soils, and delineation of selected flood plains.

Four regional reports, Berkshire, Connecticut, Central and Coastal, will be prepared as part of the study. A draft for the Central and Connecticut were released during FY 78. The Coastal report will be released in early FY 79. Specific items considered in each study area are land use, flood damages and protection, erosion and sediment, recreation, fish and wildlife, wetlands, water supply, and water quality. These documents are intended for professionals in local, state, and federal agencies for planning the conservation and development of water resources.

Public Lakes, Ponds, and Reservoirs

The Division's staff is completing an inventory of water bodies with emphasis being placed on determining their public or private status. The Berkshire region was completed and included as part of the final report in the Type IV study. An inventory was completed during FY 78 for the South Shore study area of the Coastal Region; the Nashua, Su As Co, Thames, Blackstone, and Merrimack study areas of the Central Region and the Chicopee, Westfield, Millers, Farmington, and Northern, Central and Southern Connecticut Valley Study Areas of the Connecticut Region. Most of these study areas were reviewed by pertinent agencies during FY 78. When these reviews are completed, the inventories will be included in the regional reports of the Massachusetts Water Resources Study.

Coordination

Coordination during the fiscal year included formal contacts with all 13 Regional Planning Commissions and 253 of the Commonwealth's 351 cities and towns. These contacts were primarily to give notice and solicit local participation in the Statewide Massachusetts Water Resources Study conducted in cooperation with the U.S. Department of Agriculture. A serious effort is being made to achieve consistency between water planning studies and other state planning efforts, such as the work of the Office of State Planning and the State Comprehensive Outdoor Recreation Plan.

Coordination and review of all Federal grant program applications is obtained by full participation in the A-95 review procedures. Applications which appear to relate to Water Resources interests are requested and scrutinized.

The Division is now less directly linked to the administration of the New England River Basin Commission (NERBC) but staff participation in coordinating groups and study management teams continues. Reorganization has made it possible for the Secretary of the Executive Office of Environmental Affairs to assume the position of vice-chairperson of the NERBC replacing the Chairman of the Water Resources Commission.

Coordination with the Water Resources Center at the University of Massachusetts is afforded by a continuing program of research project review.

208 Planning Assistance

The Federal Water Pollution Control Act of 1972 (P.L. 92-500) set goals for abating pollution and attaining a program of water quality management throughout the nation. Section 208 of this Act, as amended, authorized the development of areawide, (regional) comprehensive water quality management plans with funding grants to approved agencies and planning groups.

The National Environmental Policy Act of 1969, [Sect. 102-(2)-(c)], requires an Environmental Impact Statement on actions which would significantly affect the environment. The intent of the statement is to provide a broad range of alternatives to the proposed action so that the environmental issues are fully weighed before a final decision is made. The goals of these two federal statutes are combined so that the draft of the regional water quality management plan will also comply with the requirements so as to constitute an environmental impact statement.

The Division of Water Resources has been requested by the Commission of the Department of Environmental Management to review and comment on the water quality management plans as drafted and submitted by the planning agencies.

Considerable time and effort has been devoted to the review and analysis of the completed environmental impact statements from several of the designated regional planning groups. In addition, an increasing flow of elements and segments of proposed drafts from non-designated geographic planning areas have been submitted for comment.

The involvement of Division staff in reviewing detailed and voluminous plans and technical background data covering all phases of water quality problems from every region of the State has developed an awareness and insight into current opinion at the regional level of the best management practices in pollution abatement, water conservation measures and the legal/institutional issues of management plan implementation.

(PL 566) Watershed Flood Prevention Program

I. Operational Watersheds

1. Clam River - Berkshire County

All structures complete.

2. Washington Mountain Brook - Berkshire County

One structure completed. Commission voted at June 12, 1978 meeting to submit draft Environmental Impact Report to EOE. Report to be submitted by July 30, 1978. Telephone cable proposed agreement being reviewed by Division of Water Resources and Regional Forest and Parks supervisor.

3. West Branch Westfield - Berkshire & Hampden Counties

Eleven proposed structures. Draft Environmental Impact Report given to Water Resources Commission at April 24th meeting. Discussion of Draft to be taken up at August 1978 meeting.

4. Quaboag River - Worcester County

Four structures and floodwall completed. One structure, Moose Reservoir Site in Leicester, being prepared for construction. Project to be advertised in Summer, 1978, with contractor expected to be working by Fall, 1978. Remainder of projects in watershed being re-studied.

5. SuAsCo - Middlesex & Worcester Counties

Final site under construction. Site 89% completed.

6. Baiting Brook - Middlesex County

Environmental Impact Report being prepared by Soil Conservation Service.

7. Diamond Brook - Norfolk County

Federal Environmental Impact Report submitted to MEPA as part of ENF review. Proposed projects in design phase.

II. Planning Phase

1. Ten Mile - Bristol & Norfolk Counties

Work plan being developed on Watershed. Hydrologic and Hydraulic studies have been completed. Investigations of potential alternatives are underway.

2. Weweantic - Plymouth County

Preliminary planning now completed indicates a feasible project could be planned. Lack of local interest indicates no further planning be done at present.

3. Monatiquot River - Norfolk County

Watershed planning assistance was terminated in July 1959 when it was found that an exonomically feasible plan could not be developed.

4. Munn Brook-Hampden County

Lack of local support and present conditions indicate a feasible project cannot be planned. The sponsors have been asked to consider withdrawal of their application.

5. Konkaput Brook - Berkshire County

Lack of local support and present conditions indicate a feasible project cannot be planned. The sponsors have been asked to consider withdrawal of their application.

6. Smelt Brook - Norfolk County

Planning assistance was terminated in August 1960 when it became evident that local interests could not fulfill their responsibilities. The Corps of Engineers has subsequently provided assistance in implementing needed engineering works for flood protection.

7. Traphole Brook - Norfolk

Studies were done concurrently with Diamond Brook. Project measures were found to be economically unfeasible. Planning assistance has been terminated.

8. Mill River - Hampshire County

Lack of local support and present conditions indicate a feasible project cannot be planned. The sponsors have been asked to consider withdrawal of their application.

9. Green River - Berkshire County

Preliminary studies indicate that a feasible project could be planned. Local interest to date does not support further planning.

10. Ipswich River - Essex County

Premiminary studies indicate that a feasible project could be planned. Local interest to date does not support further planning.

III. Proposed Projects - None

National Flood Insurance Program

As the state coordinating agency for this program, we have been involved in fostering participation, setting priorities for rate studies and working with consultants performing the rate studies.

There are 319 communities presently participating in the program. Fifty-one communities are in the regular program and the remaining 268 communities are in the emergency program. There was one community, Gardner, which withdrew from the program on a referendum vote of its citizens. At the present time, no communities are under suspension for failure to adopt the required land use control measures.

This Division, in cooperation with the regional office of the federal insurance administration, is working with the Massachusetts Building Code Commission in an attempt to revise the state building code to conform to the minimum building requirements of the federal regulations.

Thirty-two flood insurance rate studies were assigned to contractors during FY 1978. Fourteen TYPE 19 studies, which update past rate studies, were completed in FY 1978. We have long sought to have such contracts let on a river basin basis and are gratified by the fact that this method is now most often used. Another staff recommendation has been the use of accurate topographic mapping employing orthophotogrammetric methods. The contractor working in the Nashua Basin will utilize and enlarge upon such accurate topographic mapping provided by this Division, pursuant to our own wetland restriction program. In developed areas, we hope that two foot contour base maps will become a basic water resources planning tool. (See figure 4).

-Regular Program Communities-

Bedford
Bourne
Dennis
Duxbury
Fairhaven
Falmouth
Heath
Holbrook
Marion
Mattapoissett
Nahant
Needham

New Bedford
Newbury
Norfolk
Provincetown
Quincy
Salem
Somerset
Swampscott
Swansea
Westport
Winthrop
Westwood

-Communities which joined the Regular Program during FY 1978 -

Abington	Dartmouth	Northampton
Agawam	Hadley	Pittsfield
Alford	Lexington	Randolph
Auburn	Lincoln	Scituate
Barnstable	Marshfield	Tewksbury
Blackstone	Milton	Walpole
Braintree	Newburyport	West Springfield
Brookline	Newton	Westfield
Canton	North Reading	Williamstown

Cooperative Flood Hazard Studies

Clam River

The flood hazard analysis report of the Clam River Watershed in the Town of Sandisfield was completed. The study was performed by the Soil Conservation Service in cooperation with the Massachusetts Water Resources Commission, Berkshire Conservation District, and the Town of Sandisfield. Flood frequency elevation analysis, flood profiles, and flood plain delineation maps were constructed for Clam River, Buck River and Silver Brook.

Floodplain Information Reports

Quaboag, Ware, and Swift Rivers

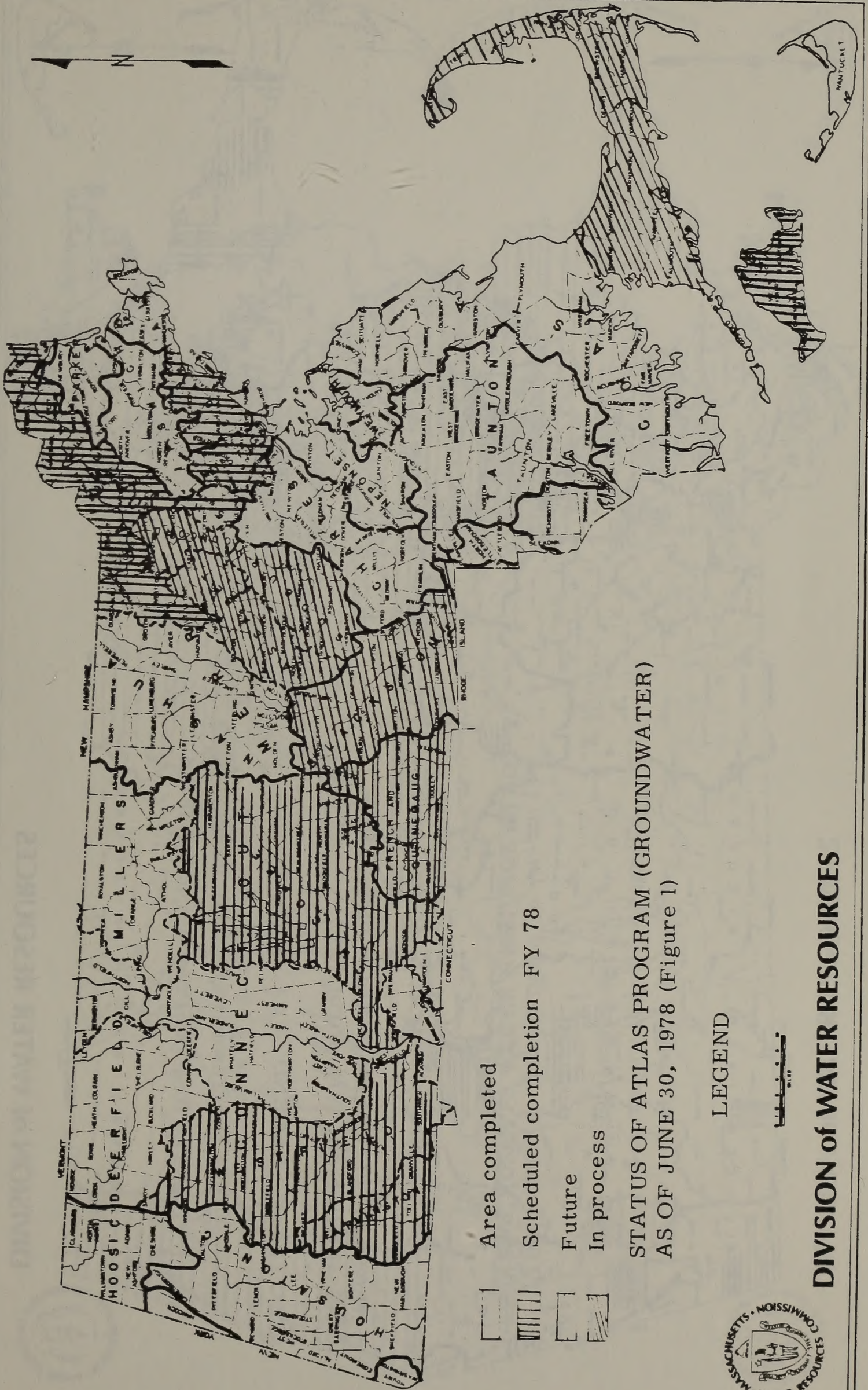
The U.S. Army Corps of Engineers completed a flood plain information report involving the Quaboag, Ware, and Swift Rivers in the Town of Palmer. The report contains profiles based on the floods of March 1936 (2 floods), September 1938, and August 1955.

RAINFALL (in inches) 1977

	State	Northeast Section	Southeast Section	Central Section	Conn. River Section	Western Section
January	3.67	4.33	4.28	3.24	2.58	2.64
February	2.76	2.47	2.72	2.59	2.92	3.10
March	5.79	5.63	5.78	6.17	6.91	6.98
April	4.19	4.10	3.87	4.74	4.86	4.52
May	3.19	3.29	3.49	2.97	4.20	3.34
June	4.04	2.98	7.39	4.37	4.30	3.45
July	2.77	2.36	2.03	3.46	4.10	3.65
August	4.78	4.18	4.76	3.59	4.27	5.28
September	6.32	5.15	5.93	6.52	7.41	7.95
October	5.85	5.39	6.73	6.54	6.37	6.07
November	3.66	4.33	2.61	4.43	5.11	4.76
December	6.00	4.66	7.29	6.13	5.59	4.57
Year	53.02	48.87	56.88	54.75	58.62	56.30
Normal	44.17	42.51	44.34	44.26	44.57	45.36

RAINFALL EXCESS OR DEFICIENCY (in inches) 1977

	State	Northeast Section	Southeast Section	Central Section	Conn. River Section	Western Section
January	+0.16	+0.74	+0.44	- 0.47	-0.72	-0.53
February	-0.53	-0.93	-0.91	-0.91	-0.20	+0.19
March	+1.97	+1.85	+1.60	+2.16	+3.27	+3.54
April	+0.59	+0.51	-0.07	+1.06	+1.28	+0.64
May	-0.44	-0.03	+0.10	-0.51	+0.25	-0.61
June	+0.51	-0.33	+4.20	+0.70	+0.35	-0.78
July	-0.87	-1.10	-0.96	-0.01	-0.04	-0.81
August	+0.78	+0.54	+0.69	-0.06	+0.20	+0.95
September	+2.52	+1.57	+2.21	+2.72	+3.66	+3.78
October	+2.32	+2.13	+3.26	+3.26	+2.91	+2.68
November	-0.24	+0.45	-1.20	+0.38	+1.17	+0.93
December	+2.08	+0.96	+3.18	+2.17	+1.92	+0.96
Total Excess	+10.93	+8.75	+15.68	+12.45	+15.01	+13.67
Total Deficiency	-2.08	-2.39	-3.14	-1.96	-0.96	-2.73
Total Excess or Deficiency for Year	+8.85	+6.36	+12.54	+10.49	+14.05	+10.94



Area completed

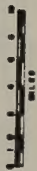
Scheduled completion FY 78

Future

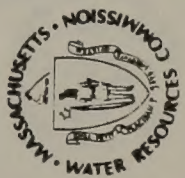
In process

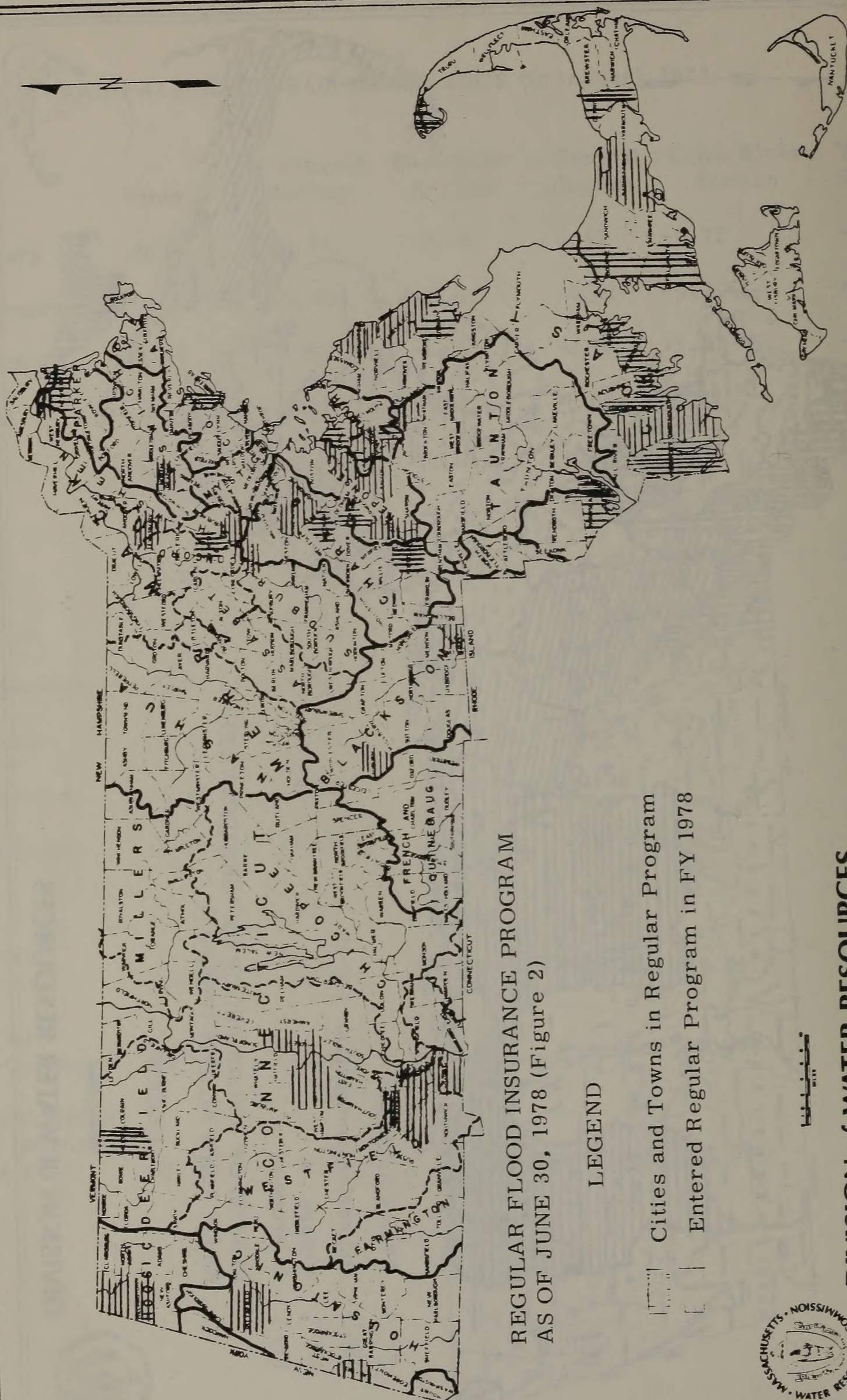
STATUS OF ATLAS PROGRAM (GROUNDWATER)
AS OF JUNE 30, 1978 (Figure 1)

LEGEND



DIVISION of WATER RESOURCES



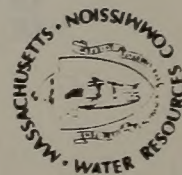


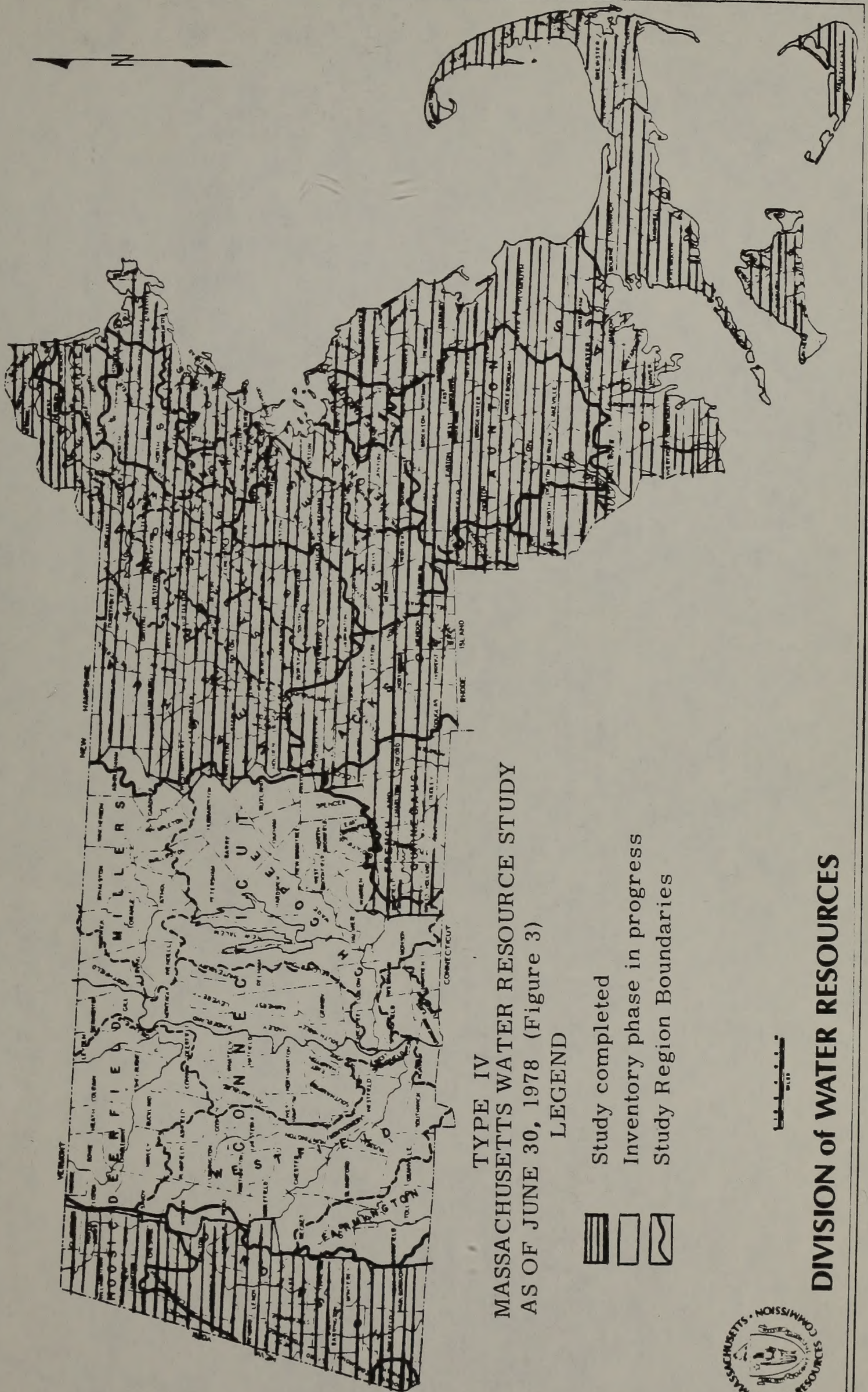
REGULAR FLOOD INSURANCE PROGRAM
AS OF JUNE 30, 1978 (Figure 2)

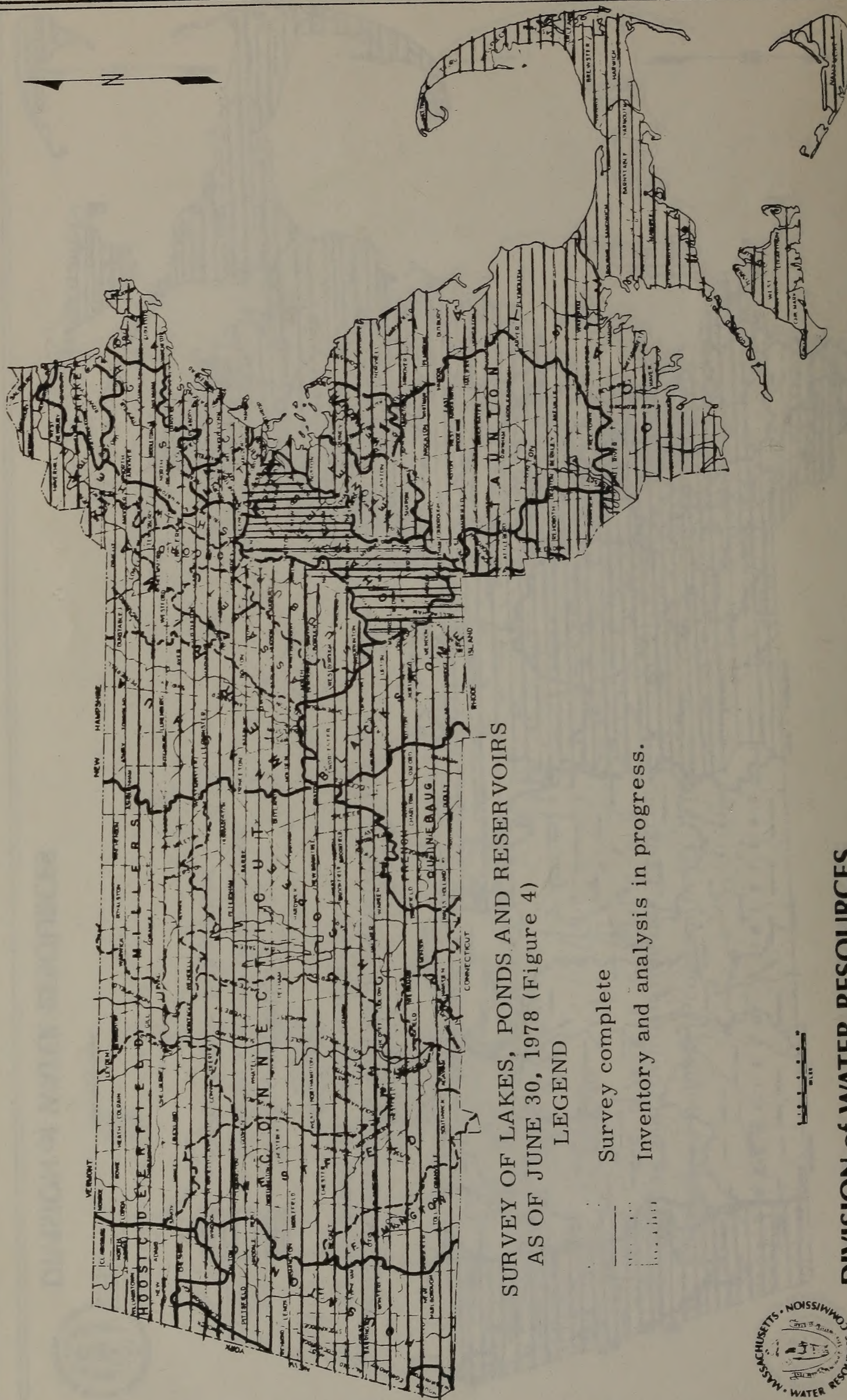
LEGEND

- Cities and Towns in Regular Program
- Entered Regular Program in FY 1978

DIVISION of WATER RESOURCES





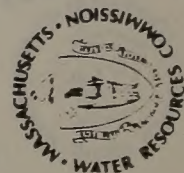


SURVEY OF LAKES, PONDS AND RESERVOIRS
AS OF JUNE 30, 1978 (Figure 4)

LEGEND

Survey complete

Inventory and analysis in progress.



DIVISION of WATER RESOURCES